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Subjective Distress, Sport Injury-Related Growth, Self-Efficacy and Wellbeing upon Return to Sport following Injury

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Abstract

This study undertook a preliminary examination of the influence of sport injury-related growth (SIRG) upon the relationship between perceived impact of injury, level of self-efficacy and psychological well-being upon return to sport following injury. One-hundred and twenty participants (61 male, 59 female, M_{age} = 29) who had been absent from sport for at least 4 weeks due to injury within the last two years completed measures of subjective distress, stress-related growth, return to sport efficacy and psychological well-being. Preacher and Hayes's (2008) mediation analysis indicated sport injury-related growth did not mediate the relationship between the subjective distress caused by injury and self-efficacy upon return to sport. Sport injury-related growth did mediate the relationship between the subjective distress and psychological well-being. These findings indicate that sport injury-related growth can aid an individual to achieve increased psychological well-being in the return to sport following injury. Future research should seek to explore in-depth the potential mechanisms underpinning the impact of SIRG upon an individual's cognitive-affective state, and consider the measurement of the construct in relation to assessing growth explicitly related to trauma from sport injury.

Key Words: Sport injury-related growth, subjective distress, psychological well-being, self-efficacy, mediation analysis

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Sports injury research has traditionally indicated that athletes respond initially to injury in a negative way due to the stressful nature of this event and the psychological harm that may occur (Bianco, Malo, & Orlick, 1999; Mankad, Gordon, & Wallman, 2009; Tracey, 2003). Recent literature, however, has provided evidence to indicate athletes can 'grow' after experiencing injury (Roy-Davis, Wadey, & Evans, 2017; Salim, Wadey, & Diss, 2015, 2016). Here, growth refers to the positive changes that take an individual to a higher level of functioning following a traumatic event (Carver, 1998), such as a sport injury. To enhance conceptual clarity within the growth literature in sport, Wadey, Evans, Hanton and Neil (2012) have also advocated that researchers justify their use of terminology, which has led to the recent creation of the term "sport injury-related growth" (SIRG), representing the perceived changes that aid injured athletes to reach a higher level of functioning to that experienced prior to injury (Roy-Davis et al., 2017).

Although there is some understanding of psychological factors important for SIRG development (see e.g., Salim et al., 2015, 2016), studies are yet to consider the relationship between the trauma of being injured, SIRG and the cognitive-affective states experienced upon return to sport. Confidence is one such variable that has been identified as an important psychological factor for athletes seeking to successfully return to sport following injury (Carson & Polman, 2012; Podlog, Banham, Wadey, & Hanton, 2015). After experiencing a sport-related injury, an athlete can experience decreased confidence throughout rehabilitation and upon returning to sport (Podlog & Eklund, 2007). Self-efficacy, a situation-specific form of confidence, has been defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Having high efficacy levels prior to and post-injury aids effective rehabilitation through reduced

perceptions of pain and improving functional movement (re)learning (Chmielewki et al., 2011; Thomee et al., 2007). Indeed, findings of a recent systematic review highlight self-efficacy as the strongest psychological predictor of satisfaction levels 2-5 years after ACL reconstruction (Arden, Kvist, & Webster, 2016). While research has yet to examine the relationship between SIRG and self-efficacy in sport, studies have been conducted in other domains where trauma is experienced. Popa and Podea (2013), for example, reported a positive relationship between stress-related growth and self-efficacy in professional rescuers. In addition, aspects of growth, such as the development of personal and social skills, may lead to increased efficacy beliefs following a traumatic event (Calhoun & Tedeschi, 2006), and individuals with higher efficacy experience report less negative outcomes post-trauma (Benight & Bandura, 2004).

In the sport injury literature, efficacy beliefs are also suggested to be important for an athlete's psychological well-being (PWB) and motivation in relation to a successful return to sport following injury (Podlog & Eklund, 2007). The term PWB has been described as "the balance point between an individual's resource pool and the challenges faced" (Dodge, Daly, Huyton, & Sanders, 2012, p. 230) and is said to represent experiences of personal growth, mastery and self-acceptance (Felton & Jowett, 2013). The general consensus surrounding the relationship between physical activity and PWB is that a positive one exists, with the notion that being active benefits mental health (Blumnthal & Ong, 2009). In contrast, cognitive models regarding the psychology of injury (e.g., Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998) suggest an injury may lead to negative thoughts or appraisals, emotional disruption and reduced adherence to rehabilitation programmes, threatening an athlete's identity, coping resources and subsequent PWB (Christakou & Lavallee, 2009; Wadey & Evans, 2011). However, when an athlete has high levels of PWB they tend to return to sport sooner, suggesting this is important in the recovery/rehabilitation phase (Ford, Eklund, & Gordon,

2000). SIRG has been proposed to be associated with positive affect, a construct closely linked to PWB (Wadey et al., 2015), and is based on an athlete's positive outlook on life and the long-term benefits they perceive after experiencing an injury, both indicative of improved PWB (Roy-Davis et al., 2017).

Although there is some understanding of psychological factors important for SIRG development (see e.g., Salim et al., 2015, 2016), researchers have hitherto not examined the relationship between SIRG and cognitive-affective states experienced upon return to sport. As self-efficacy and PWB have both been identified as important psychological predictors of a successful return to sport (Podlog et al., 2015; Ardern, Taylor, Feller, & Webster, 2013) they represent initial variables for consideration. Therefore, the aim of the current study was to preliminarily examine the relationship between the subjective distress caused by an injury, SIRG, self-efficacy and PWB in previously injured athletes. As the literature suggests that injury can cause reductions in PWB and self-efficacy (Wadey et al., 2011), it was hypothesized that subjective distress caused by the injury would have a negative relationship with both variables. Based on SIRG being positively related to self-efficacy and PWB (Roy-Davis et al., 2017) it was predicted that SIRG would negatively mediate the relationship between subjective distress and both self-efficacy and PWB.

Method

Participants

One hundred and twenty previously injured athletes (61 male, 59 female, mean age = 29 ± 9.97 years) participated in this study. All participants were English speaking, with ninety British participants and the remaining thirty from different countries. The sample comprised elite (n = 24) and non-elite (n = 96) athletes from ten team and twelve individual sports (e.g., athletics, squash, rugby, hockey, running, cycling). All participants had been injured within two years prior to the onset of the study, with diverse injuries including muscle

pulls/tears (*n* = 32), fractures (*n* =17), ligament damage (*n* =32), and broken bones (*n* =12) reported. All participants had fully recovered from their injuries and returned to competition at the time of survey completion.

Measures

Subjective Distress. The Impact of Events Scale-Revised (IES-R; Weiss & Marmar, 1997) was used as a 22-item measure of subjective distress experienced following injury (e.g. item: "I felt as if it hadn't happened or wasn't real"). Participants recorded how distressing each statement had been for them during the absent period from sport (i.e., recovery/rehabilitation) using a 5-point rating scale between 0 (Not at all) and 4 (Extremely). This scale has three dimensions; intrusion (IE-INT, 8 items), avoidance (IE-AVD) and hyper-arousal (IE-HYP), and a total impact of event score (IE-TOT) can be computed. The scoring ranges from 0-88, with a score ≥24 meaning post-traumatic stress disorder is a clinical concern. The IES-R has been used to measure the effects of routine life stress, everyday traumas and acute stress (Weiss, 2007). This measure has shown high levels of internal consistency in previous research (Cronbach's alpha range = 0.79-0.94; Weiss & Marmar), with similar findings evident for the IE-INT (Cronbach's alpha = 0.88), IE-AVD (Cronbach's alpha = 0.81), IE-HYP (Cronbach's alpha = 0.82) subscales, and IE-TOT (Cronbach's alpha = 0.94) in the present study.

Sport Injury-Related Growth (SIRG). SIRG was measured using the Stress-Related Growth Scale (SRGS; Park, Cohen, & Murch, 1996). This measure consists of a 50-item one-dimensional scale devised to measure an individual's perceived growth after a stressful life event (e.g. item: "I learned that I was stronger than I thought I was"). The questionnaire stem was modified for use with sport injury "Rate how much you experienced each item below as a result of your injury", as previously employed in SIRG research (e.g., Wadey et al., 2015; Salim et al., 2015). Participants were asked to rate their agreement with all items from 0 (Not

at all) to 2 (A great deal). Park et al. (1996) report that the SRGS has demonstrated factorial validity, with an adequate test-retest and internal reliability (Cronbach's alpha = 0.94; two-week test-retest reliability = .81), with high internal reliability reported for this study sample (Cronbach's alpha = 0.95).

Return to Sport Self-Efficacy. The General Self-Efficacy Questionnaire (GSEQ; Schwarzer & Jerusalem, 1995) was used to measure the athlete's self-efficacy upon returning to sport by adapting the questionnaire stem to "upon returning from my injury in sport, I believed". The GSEQ is a 10-item scale designed to access the optimistic self-beliefs individuals use to cope with a variety of life demands (e.g. item: "I can always manage to solve difficult problems if I try hard enough"). Participants responded to each item on a rating scale ranging from 1 (Not true at all) to 4 (Exactly true). The GSEQ has reported suitable internal reliability across several languages (Cronbach's alpha range = 0.75 -0.94; Lusczynska, Scholz, & Schwarzer, 2005), with a high internal reliability score reported for the current study (Cronbach's alpha = 0.93).

Psychological Well-Being (PWB). The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS; Tennant et al., 2007) was used to assess the athlete's PWB upon returning to sport by adapting the questionnaire stem to "Below are some statements about feelings and thoughts. Please tick the box that best describes your experience of each feeling/thought upon returning to sport after experiencing your injury". The WEMWBS is a 14-item PWB scale (e.g. item: "I've been dealing with problems well"), with responses to all items recorded on a rating scale from 1 (none of the time) to 5 (all of the time). The WEMWBS incorporates affective-emotional aspects, cognitive-evaluative dimensions and psychological functioning of the participants, covering both hedonic and eudemonic aspects of mental health (Tennant et al.). A minimum score of 14 and a maximum score of 70 can be obtained, with all items on the scale being scored positively. This measure has previously demonstrated high levels of

internal reliability (Cronbach's alpha = 0.91; Tennant et al.), with a high internal reliability score reported for the present study (Cronbach's alpha = 0.93).

Procedure

Ethical approval was granted by the departmental ethical committee of the primary author prior to commencement of this study. Following institutional ethical approval, participants were opportunistically recruited via social media platforms and e-mail communications to sports clubs, teams, coaches and sports medicine professionals across the UK. Potential participants were provided with an online link to a survey pack, which was developed using Qualtrics survey software (www.qualtrics.com). The survey pack contained a study information sheet, a consent form, a demographics section that asked for general information about the athletes (age, gender, performance status) and specific details about the injury (occurrence, type, absence period), and the study measures. Prior to participation, individuals were informed that their involvement in the study was voluntary, there was no correct/incorrect answer to any of the questions, the answers would remain strictly confidential and securely stored on computers within the university department of the lead author, and that they could withdraw from the study at any time during or after data input. Following reading of the information sheet and the provision of consent, individuals were asked to complete the remainder of the online survey. The online survey pack took approximately twenty minutes to complete. Data was collected over a 6-month period (January 2017–May 2017).

Data analysis

Data analysis was conducted using SPSS version 22 and an alpha criterion of $p = .05$ was set. Preliminary analysis (review of frequencies, descriptive statistics and correlations) was undertaken to determine the potential influence of demographic variables on the main variables of interest. Mediation analyses were then performed using the 'PROCESS'

bootstrapping macro in SPSS (Hayes, 2013). The PROCESS macro allows for estimation of the coefficients in simple and complex mediation models, whilst giving an estimate of the indirect effects, various inferential tests and additional output (Hayes, 2013). Eight mediation analyses were run, including the three dimensions and global score for subjective distress (IE-INT, IE-AVD, IE-HYP, IE-TOTAL) as dependent variables, SIRG as the mediator variable, and self-efficacy and PWB as dependent variables. Assumption testing was conducted to make sure there were no violation effects.

Results

Preliminary analysis

Table 1 reports descriptive statistics (means and standard deviation bivariate correlations and alpha coefficients) for subjective distress, SIRG, self-efficacy and PWB scores. There was no relationship between SIRG and age (r = -0.16, p = .07) and time taken to return to sport following injury (r = 0.01, p = .90). There was no relationship between self-efficacy and age (r = -0.05, p = .63) and time taken to return to sport following injury (r = -0.13, p = .15). There was no relationship between PWB and age (r = 0.03, p = .79) and time taken to return to sport following injury (r = -0.11, p = .25). A negative relationship was found between age and IE-INT (r = -0.27, p = .00), IE-AVD (r = -0.33, p = .00), IE-HYP (r = -0.23, p = .01) and IE-TOTAL (r = -0.29, p = .00). There was no relationship between time taken to return to sport following injury and IE-INT (r = 0.04, p = .65), IE-AVD (r = 0.10, p = .28), IE-HYP (r = 0.07, p = .46) and IE-TOTAL (r = 0.08, p = .42).

Performance level differences in independent, mediator, and dependent variables were assessed by comparing scores for elite (semi-professional, professional, international and international & professional) versus non-elite athletes (recreational, university, high school). Two participants did not classify their competitive level and were thus excluded from this analysis. There were no differences between elite and non-elite athletes for SIRG (t [118] =

1.23, p = .22), self-efficacy (t [118] = 0.79, p = .44), PWB (t [118] = -1.98, p = .05), IE-INT (t [118] = 1.57, p = .13), IE-AVD (t [118] = 0.65, p = .52), IE-HYP (t [118] = 1.11, p = .27), and IE-TOTAL (t [118] = 1.24, p = .22).

Injury-based differences in independent, mediator, and dependent variables were assessed by comparing scores for individuals that experienced muscular/joint (i.e., ligament damage, muscular tears, sprains, strains, dislocation, nerve, tissue and cartilage damage) versus skeletal injuries (i.e., breaks, fractures and chipped bones). Injuries not classified in these groups were excluded from this analysis (n = 13). There were no differences between muscular/joint and skeletal injuries for SIRG (t [107] = -1.12, p = .32), self-efficacy (t [107] = 0.71, p = .48), PWB (t [107] = -0.50, p = .62), IE-INT (t [107] = 0.21, p = .84), IE-AVD (t [107] = 0.43, p = .67), IE-HYP (t [107] = 0.12, p = .90) and IE-TOTAL (t [107] = 0.39, p = .70).

Mediation analysis

The mean direct and indirect effects of each independent variable were established using a bootstrapping method in SPSS PROCESS for the eight mediation analyses (Table 2) and confidence intervals (CI) determined if an effect existed. There was no indirect effect of IE-INT (CI=-0.02, 0.13), IE-AVD (CI = -0.05, 0.16), IE-HYP (CI = -0.02, 0.18) and IE-TOTAL (CI = -0.01, 0.06) on self-efficacy. This indicates that SIRG was unable to mediate the relationship between the subjective distress caused by an injury and an athlete's self-efficacy upon return to sport. There was no direct effect of IE-INT (CI = -0.19, 0.13), IE-AVD (CI = -0.49, 0.16), IE-HYP (CI = -0.29, 0.17), and IE-TOTAL (CI = -0.07, 0.07) on self-efficacy. This suggests that the subjective distress caused by an injury is not related to self-efficacy upon return to sport. The data showed indirect effects of IE-INT (CI = 0.02, 0.33), IE-AVD (CI = 0.01, 0.42), IE-HYP (CI = 0.03, 0.48) and IE-TOTAL (CI = 0.01, 0.17) on PWB. These scores indicate that SIRG positively mediated the relationship between the

subjective distress caused by injury and an athlete's PWB upon return to sport. There was no direct effect of IE-INT (CI = -0.42, 0.09), IE-AVD (CI = -0.39, 0.22). IE-HYP (CI = -0.65, 0.04), and IE-TOTAL (CI = -0.18, 0.37) on PWB. This suggests that the subjective distress caused by an injury is not related with an athlete's PWB upon return to sport.

Discussion

This study sought to gain further understanding into the psychological responses athletes experience following their return to sport after an injury. Specifically, how the concept of SIRG may influence the relationship between the subjective distress reported from the trauma of the injury and an athlete's subsequent self-efficacy and PWB levels upon returning to competing in their sport. Despite scholars (e.g., Chmielewki et al., 2011) proposing that psychological factors, such as self-efficacy, have a significant impact upon recovery after sport-related injuries, the results of the current study did not support this relationship. Specifically, there was no relationship between IE and self-efficacy, and perceived SIRG did not act as a mediator between these variables, thus, there was no support for our first hypothesis. Self-efficacy is a concept which has been proposed to be task-centred, affecting a person's decision-making, levels of persistence, and effort expenditure (Bandura, 1997). The degree of difficulty associated with a task (such as successfully returning to sport following injury), the effort required to achieve a goal, and the external support perceived to be available from relevant others are all purported to influence performance accomplishments, a primary source of efficacy (see Bruton, Mellalieu, Shearer, Roderique-Davies, & Hall, 2013). Self-efficacy to return successfully to sport is therefore likely to increase if the task ahead is perceived to be a challenging but achievable one, effort is required, and an amount of guidance is provided (Lirgg, George, Chase, & Ferguson, 1996). A potential explanation for the lack of significant relationships between the variables in the present findings, therefore, is that the athletes involved in this study may not have

experienced significant injuries (or traumatic events) previously, meaning that they may not have learnt the effective coping strategies needed to enhance self-efficacy, and therefore lacked salient performance accomplishment information. Indeed, previous literature focusing on traumatic experiences and growth in other domains, such as that of professional rescuers (e.g., Popa & Podea, 2013), occurs in contexts where individuals are repetitively placing themselves in a distressing or impactful situation and arguably provides a different context for the examination of these variables.

Our results also indicated that the second hypothesis was only partially supported. Specifically, no relationship was found between subjective distress and PWB, but SIRG did mediate the relationship between these two variables. We interpret this result to indicate that growth may potentially aid individuals to achieve increased levels of PWB after returning to sport following an injury. This finding is unsurprising given that existing research in the growth literature suggests those individuals who have experienced adversity (e.g., a sport injury) are more likely to report improved well-being levels and mental health (Seery, 2011). Joseph and Linley (2005) discussed the organismic valuing process (OVP) as a mechanism for the growth experienced following the adversity of a traumatic or impactful event, and its influence upon PWB. Specifically, OVP refers to an individual's natural ability to understand what is important to them, ensuring that they follow the correct path of behaviours and actions in order to ensure increased levels of PWB (Joseph & Linley). Here, it should be noted though that OVP is merely one avenue through which growth can occur, emphasising that there are a myriad of other ways that greater PWB can develop (Joseph & Linley, 2006). We suggest therefore that future research consider additional influences behind the growth experienced through the rehabilitative journey, and the other salient elements that may allow PWB to form.

The findings of the present research are in line with those of Wadey et al. (2015), who sought to explore whether SIRG would mediate the relationship between the self-determination perspective of needs satisfaction and well-being. Self-determination theory emphasises that need-satisfying environments lead to indicators of well-being, to help achieve optimal functioning (Ryan & Deci, 2000). Specifically, if an athlete believes they are making sufficient progress during their recovery, by meeting personal targets, positive emotions are more likely to occur (Podlog, Lochbaum, & Stevens, 2010). In relation to the present study, as all the participants had returned to participating in sport following injury, during the rehabilitation process it is likely that they will have been able to achieve their personal aims/goals to a degree to return to their pre-injury state, thereby potentially satisfying an aspect of their fundamental needs..

From an applied perspective, the findings of the present study provide further support for the importance of developing effective coping mechanisms for athletes to improve their psychological state following an injury. Our findings emphasise that relevant sports professionals (e.g., physiotherapists, sport psychologists, coaches) should consider how to offset or reduce the negative psychological consequences of injury and aid the return-to-sport process by seeking to develop self-efficacy and PWB, through the promotion of SIRG. However, it is important to consider that practitioners need to be aware that achieving SIRG may not be a straightforward outcome to achieve for some athletes, with further support required (Salim et al., 2015).

Although our study demonstrates novelty by being the first to consider the relationships between subjective distress, SIRG, self-efficacy and PWB, a potential limitation is the cross sectional nature of the design adopted and the extent to which the degree of causality can be inferred between the variables under investigation. While the mediation analysis undertaken in our study allows a degree of causality to be assumed, future research

needs to replicate this study with a larger sample of previously injured athletes to increase the power of the mediation model. Longitudinal consideration of these variables is also required to glean a greater understanding of the dynamic nature of these potential relationships. Here, the use of both quantitative and qualitative approaches can assist in understanding the underpinning mechanisms of SIRG and the role multiple psychological factors play in sport injury rehabilitation outcomes (Ombremskey, Pappas, Attallah-Wasif, Tornetta, & Bhandari, 2005; Podlog & Eklund, 2006; Roy-Davis et al., 2017; Salim et al., 2016). A further limitation of the current study is that the SRGS does not directly measure SIRG. The SRGS is a general growth scale created by Park et al. (1996), which includes measures asking about general stress-related growth concepts, such as religious beliefs, therefore lacking the sensitivity of the scale to consider growth in specific relation to injury. Recently, Roy-Davis et al. (2017) have established the concept of SIRG in order to work towards creating a more standardized term when assessing a sport-related injury. To date, however, no measure exists to consider this concept. The development of such a measure therefore represents a clear priority for future research in advancing the understanding of growth and sport injury.

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Table 1. Descriptive statistics including means and standard deviations (SD), alpha coefficients and bivariate correlations for all study variables.

Variables	**Mean**	**SD**	***α***	**1**	**2**	**3**	**4**	**5**	**6**	**7**
SIRG	37.95	25.67	0.72	-						
Self-efficacy	30.88	6.10	0.71	0.11	-					
PWB	49.47	9.56	0.71	0.28*	0.16	-				
IE INT	10.27	7.36	0.62	0.40**	0.01	-0.02	-			
IE AVD	8.26	6.30	0.63	0.46**	0.11	0.06	0.75**	-		
IE HYP	6.05	5.24	0.65	0.36**	-0.01	-0.06	0.85**	0.74**	-	
Total IE	24.70	17.48	0.54	0.45**	0.05	-0.00	0.94**	0.90**	0.93**	-

*. Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is Significant at the 0.01 level (2-tailed)

Note. SIRG, Sport injury-related growth, PWB, Psychological well-being, IEINT, Impact of event intrusion, IEAVD, Impact of event avoidance, IEHYP, Impact of event hyper-arousal, Total IE, Total impact of event.

Table 2. Bootstrap analysis summary showing all mean indirect effects between the impact of event through SIRG in associations with PWB and Self-efficacy.

Independent variables	Mediator variable	Dependent Variables	*a* path coefficient	*b* path coefficient	*c'* path coefficient	Mean Indirect effect	SE of mean	BC 95% CI mean Indirect effect (lower & upper)
IE INT	SIRG	Self-Efficacy	1.39	0.03	-0.03	0.04	0.04	-0.02, 0.13
IE AVD	SIRG	Self-Efficacy	1.85	0.02	0.07	0.03	0.05	-0.05, 0.16
IE HYP	SIRG	Self-Efficacy	1.78	0.03	-0.06	0.05	0.05	-0.02, 0.18
Total IE	SIRG	Self-Efficacy	0.66	0.03	0.001	0.07	0.02	-0.01, 0.06
IE INT	SIRG	PWB	1.39	0.10	-0.16	0.14	0.08	0.02, 0.33*
IE AVD	SIRG	PWB	1.85	0.09	-0.09	0.17	0.11	0.01, 0.42*
IE HYP	SIRG	PWB	1.78	0.11	-0.31	0.19	0.11	0.03, 0.48*
Total IE	SIRG	PWB	0.66	0.11	-0.07	0.07	0.04	0.01, 0.17*

Outputs with an '*' refer to significant data. These values are based on the under-standardized path coefficient. IE Intrusion, impact of event intrusion, IE AVD, impact of event avoidance, IE HYP, impact of event hyper-arousal, Total IE, total impact of event, SIRG, sport injury-related growth, Self-efficacy, PWB, psychological well-being, SE, standard error, BC, bias corrected, CI, confidence interval. *$P \leq 0.05$ level.